CLAIMS

What is claimed is:

1. A method for creating multiple vertical hydraulic fractures oriented at differing azimuths in a formation of unconsolidated and weakly cemented sediments, comprising:

   a. drilling a bore hole in the formation to a predetermined depth;

   b. installing an injection casing in the bore hole at the predetermined depth;

   c. injecting a fracture fluid into the injection casing with sufficient fracturing pressure to dilate the injection casing and the formation in a first preferential direction and thereby initiate a first vertical fracture at a first azimuth orthogonal to the first direction of dilation; and

   d. further injecting the fracture fluid into the injection casing with sufficient fracturing pressure to dilate the injection casing and the formation in a second preferential direction different from the first preferential direction,

   e. preventing the fracture fluid from entering the first vertical fracture and thereby initiating a second vertical fracture at a second azimuth orthogonal to the second preferential direction of dilation.

2. The method of Claim 1, wherein the method further comprises:

   a. installing the injection casing at a predetermined depth in the bore hole, wherein an annular space exists between the outer surface of the casing and the bore hole,

   b. filling the annular space with a grout that bonds to the outer surface of the casing, wherein the casing has multiple initiation sections separated by weakening lines so that the initiation sections separate along the weakening lines under the fracturing pressure.

3. The method of Claim 2, wherein the fracture fluid dilates the grout and the formation to initiate the first fracture in the formation at a first weakening line and subsequently the fracture fluid dilates the grout and formation to initiate the second fracture in the formation at a second weakening line.

4. The method of Claim 1, wherein the fracture fluid does not leak off into the formation from the fracture.

5. The method of Claim 1, wherein the fracture fluid comprises a proppant, and the fracture fluid is able to carry the proppant of the fracture fluid at low flow velocities.

6. The method Claim 1, wherein the fracture fluid is clean breaking with minimal residue.

7. The method of Claim 1, wherein the fracture fluid has a low friction coefficient.

8. The method of Claim 1, wherein the fracture fluid comprises a water based guar gum gel slurry.

9. The method of Claim 3, wherein the casing comprises two initiation sections with two directions of dilation and the first and second weakening lines are orthogonal.

10. The method of Claim 3, wherein the casing comprises three initiation sections with three directions of dilation.

11. The method of Claim 3, wherein the casing comprises four initiation sections with four directions of dilation, with the first and second weakening lines being orthogonal to each other and the third and fourth weakening lines being orthogonal to each other.

12. The method of Claim 2, wherein the initiation sections remain separated after dilation of the casing by the fracture fluid to provide hydraulic connection of the first and second fractures with the well bore following completion of hydraulic fracturing.

13. The method of Claim 2, wherein the fracture fluid comprises a proppant and the initiation sections each contain well screen sections separating the proppant in the

hydraulic fractures from the production well bore and thus preventing proppant from flowing back from the fracture into the production well bore during fluid extraction.

14. The method of Claim 1, wherein the method further comprises re-fracturing of each previously injected fractures.

15. The method of Claim 1, wherein the dilation of the formation is achieved by first cutting a vertical slot in the formation at the required azimuth for the first initiated fracture, injecting a fracture fluid into the slot with a sufficient fracturing pressure to dilate the formation in this first preferential direction and thereby initiate the first vertical fracture at an azimuth orthogonal to the first direction of dilation; and following the first fracture injection, by subsequently injecting the fracture fluid into the second and subsequent slot cut into the formation at the required fracture azimuth with a sufficient fracturing pressure to dilate the formation in the second and subsequent preferential direction at a different azimuth to the first and subsequent preferential directions, preventing the fracture fluid from entering the first and subsequent earlier vertical fractures and thereby initiate a second and subsequent vertical fracture at an azimuth orthogonal to the second and subsequent direction of dilation.

16. A well in a formation of unconsolidated and weakly cemented sediments, comprising:

a. a bore hole in the formation to a predetermined depth;

b. an injection casing in the bore hole at the predetermined depth;

c. a source for delivering a fracture fluid into the injection casing with sufficient fracturing pressure to dilate the injection casing and the formation in a first preferential direction and thereby initiate a first vertical fracture at a first azimuth orthogonal to the first direction of dilation and to dilate the injection casing and the formation in a second preferential direction different from the first preferential directions and thereby initiate initiating a second vertical fracture at a second azimuth orthogonal to the second direction of dilation.

17. The well of Claim 16, wherein the injection casing further comprises:

a. multiple initiation sections separated by weakening lines

b. multiple passages within the initiation sections and communicating across the weakening lines for the introduction of the fracture fluid to dilate the casing and separates the initiation sections along the weakening lines, wherein the passages are interconnected to the source of fracture fluid to dilate the injection casing and the formation in the first preferential direction and thereby initiate the first vertical fracture at the first azimuth orthogonal to the first direction of dilation and to dilate the injection casing and the formation in the second preferential direction different from the first preferential directions and thereby initiate initiating the second vertical fracture at the second azimuth orthogonal to the second direction of dilation.

18. The well of Claim 16, wherein the fracture fluid does not leak off into the formation from the fracture.

19. The well of Claim 16, wherein the fracture fluid comprises a proppant, and the fracture fluid is able to carry the proppant of the fracture fluid at low flow velocities.

20. The well Claim 16, wherein the fracture fluid is clean breaking with minimal residue.

21. The well of Claim 16, wherein the fracture fluid has a low friction coefficient.

22. The well of Claim 16, wherein the fracture fluid comprises a water based guar gum gel slurry.

23. The well of Claim 17, wherein the initiation sections remain separated after dilation of the casing by the fracture fluid to provide hydraulic connection of the first and second fractures with the well bore following completion of hydraulic fracturing.

24. The well of Claim 17, wherein the fracture fluid comprises a proppant and the initiation sections each contain well screen sections separating the proppant in the hydraulic fractures from the production well bore and thus preventing proppant from flowing back from the fracture into the production well bore during petroleum fluid extraction.